knew him for his uprightness, modesty, unselfishness, and generosity to fellow-workers, always helping young inquirers with specimens and information, he was suddenly lost to sight as a friend and father, but remains in the minds of fellow-workers, of those whom he so freely taught, and of his stricken relatives, as a great and good man, whose beneficent influence will ever be felt in a wide-spreading and advancing science, and among thoughtful and appreciative men in all time.

ALPHONSE FAVRE.

By the death of Prof. A. Favre, Switzerland has been deprived of one of her foremost men of science, and geology has lost a very assiduous and successful cultivator. His death appears to sever the last remaining link between the present generation of Swiss geologists and that older and famous one which included Bernhard Studer, Arnold Escher von der Linth, Peter Merian, and Oswald Heer. The late Prof. Favre, who had reached the age of seventy-seven at the time of his death, was the author of numerous papers, the earliest of which, "On the Anthracites of the Alps," was published as long ago as 1841. He will perhaps be best remembered by the part he took in the famous controversy concerning the supposed admixture of fossils, belonging to different geological horizons, which were said to occur in the same beds in the Alps. In opposition to M. Scipion Gras and others who asserted that such intermixture of fossils did actually occur, Favre was able to show, by a series of patient investigations, that the apparent reversals of succession, and intimate union of Carboniferous, Jurassic, and Tertiary strata, could all be accounted for by repeated interfoldings and complicated overthrust faults. It is interesting to note that at the time when Favre was thus successfully contending for such an interpretation of supposed anomalies in the Alpine rocks, James Nicol in this country was engaged in a precisely similar controversy with Murchison and his followers, concerning the rocks of our own Highlands. But whereas the triumph of Favre's views was immediate and complete, and their author lived to see the justice of his interpretation universally admitted, Nicol was fated to witness the influence of great authority exerted for a long time in preventing the truth of his conclusions from being accepted; and only after his death was the retraction made which showed how much Scotland owes to this able interpreter of the geological structure of his native land. History may be relied upon, however, to do equal justice to the successful Swiss geologist and the disappointed Scotch one. Prof. Favre, besides papers on a great variety of geological questions, wrote several works dealing with the geology of the parts of Savoy, Piedmont, and Switzerland of which Mont Blanc forms the centre. During the later years of his life he had retired from his Professorship of Geology at Geneva, but up to the time of his death Favre held the post of President of the Federal Commission having charge of the geological map of Switzerland. As long ago as 1874 he was elected a foreign member of the Geological Society, and he was also a correspondent of the Institute of France.

AID TO ASTRONOMICAL RESEARCH.

PROF. PICKERING, of the Harvard College Observatory, has issued the following notice:—

"Miss C. W. Bruce offers the sum of six thousand dollars ($6000) during the present year in aiding astronomical research. No restriction will be made likely to limit the usefulness of this gift. In the hope of making it of the greatest benefit to science, the entire sum will be divided, and in general the amount devoted to a single object will not exceed five hundred dollars ($500). Precedence will be given to institutions and individuals whose work is already known through their publications, also to those cases which cannot otherwise be provided for, or where additional sums can be secured if a part of the cost is furnished. Applications are invited from astronomers of all countries, and should be made to the undersigned before October 1, 1890, giving complete information regarding the desired objects. Applications not acted on favourably will be regarded as confidential. The unrestricted character of this gift should insure many important results to science, if judiciously expended. In that case it is hoped that others will be encouraged to follow this example, and that eventually it may lead to securing the needed means for any astronomer who could so use it as to make a real advance in astronomical science. Any suggestions regarding the best way of fulfilling the objects of this circular will be gratefully received. "EDWARD C. PICKERING.

"Harvard College Observatory, Cambridge, Mass.,
U.S.A., July 15, 1890."

NOTES.

THE American Association for the Advancement of Science will meet this year at Indianapolis, under the presidency of Prof. Goodale. The first meeting will be held on August 19. The subject selected in advance for special discussion is "The Geographical Distribution of North American Plants," and papers upon it will be presented by Messrs. Watson, Macoun (of Ottawa), Sargent, Britton, Underwood. Halsted, and Coulter.

A ROYAL COMMISSION has been appointed to inquire and report "what is the effect, if any, of food derived from tuberculous animals on human health, and, if predjudicial, what are the circumstances and conditions with regard to the tuberculosis in the animal which produce that effect upon man." Lord Basing is chairman. The other Commissioners are Prof. G. T. Brown, Dr. George Buchanan, Mr. Frank Payne, and Prof. Burdon Sanderson.

THE Turin Academy of Medicine has proposed the following theme for the Riberi Prize of about £750: "Researches on the nature and the prophylaxis of one or several infectious diseases of man." Works may be sent printed or in manuscript; they may be in Italian, French, or Latin; and printed works must have appeared since 1886. The date limit is December 31, 1891.

THE failure of the Government to carry its scheme for the extinction of some public-house licences is likely to result in an important advantage to education. In his statement on Monday with respect to the money which was to have been applied to this object, Mr. Goschen said:—"As regards England we propose to add the amount set free by the abandoned licensing clauses to the residue which, under the Bill as it stands, goes to the county councils, accompanying this inclusion by an intimation that possibly new charges may, by and by, be put upon them, with reference to intermediate, technical, or agricultural education. It seems very desirable, if more is to be done in this respect, that the localities, and especially county councils, should be interested in the work. In England there is at present little machinery available for carrying out such an object, and it would be impossible to create such a machinery at this period of the session. But in Wales and in Monmouthshire the machinery does exist. County councils may supply funds to the joint committee for intermediate education under the Act of last year out of the county rate, but to the extent of a halfpenny of such rates only. We shall propose that the county councils in Wales should have authority to increase the sum out of the additional funds now placed at their disposal. . . . As regards Ireland we shall propose that the £40,000 which falls to her share should be utilized for the further promotion of intermediate education, and for this purpose should be placed at the disposal of the Intermediate Education Board for Ireland, a body which, I believe, commands the confidence of the Irish public generally, irrespective of political and religious differences." The Government propose that the £50,000 which falls to the share of Scotland shall be handed over unconditionally to the county councils; but Mr. Campbell-Bannerman has given notice that he will move an amendment to the effect that the money be devoted directly to the completion of a scheme of free primary education.

THE Drapers' Company, London, has contributed £3000 towards the cost of the new buildings for technical instruction in connection with Nottingham University College. This branch of the College will be under the care of the recently-appointed Professor of Mechanical Engineering and Technology, Mr. William Robinson, late chief assistant at the City and Guilds Technical College, Finsbury.

A PUBLIC MEETING was held at the Town Hall, Kensington, yesterday, under the presidency of the Hon. and Rev. E. Carr Glynn, to consider measures whereby the technical and scientific education of apprentice and other plumbers may be ensured.

LAST week the Institute of Electrical Engineers held a series of meetings at Edinburgh in connection with the International Exhibition. The series began on Tuesday, when Dr. Hopkinson occupied the chair. Dr. Walmsley read a paper on some of the principal features of the Exhibition, in which he referred particularly to the telegraph and electric light apparatus and gas-engines. Mr. A. R. Bennett read a paper on "Foreign Currents in Telegraph and Telephone Lines." He described experiments he had carried out with overhead wires, and pointed out their effect in wet weather. Mr. W. H. Preece said that the foreign currents found in electric wires were far more readily perceptible in telephone than in telegraph wires. The currents were due often to the swing of the wires, and greatly to the alternating system of generating electric light recently introduced. Mr. Bennett said that disturbances might be caused by the introduction of electric tramways. In the evening the members of the Society attended a *conversazione* given in their honour in the grand hall of the Exhibition. On Wednesday, when the chair was taken by Mr. W. H. Preece, a paper on "The Working Efficiency of Secondary Cells" was read. This paper, of which we hope to give some account, was the joint work of Messrs. W. E. Ayrton, C. G. Lamb, E. W. Smith, and M. W. Woods. On Thursday, Mr. Spagnoletti was in the chair, and Mr. A. R. Bennett read a paper on "Experiments on Radiometry." Some discussion followed, in which Dr. Walmsley, Mr. Stroh, Mr. Fairfax, and others took part.

AT the instance of a number of Magdeburg manufacturers, an electro-technical experimental station is about to be founded in that town, to afford to companies or private persons opportunity of experimenting as to the practicability and cost of various electrical arrangements, and of testing machines, apparatus, &c. The station will be arranged on the pattern of one already in existence at Munich, but expanded in several directions. Dr. M. Krieg, editor of the *Electrotechnical Echo*, will be at its head. Among other matters which will come under consideration, are the examination of arrangements for illumination, transmission of force, and metallurgical purposes, determination of the luminous power of arc and glow lamps, and of constants, such as intensity and tension of current, testing of carbon rods, of measuring-instruments, accumulators, primary batteries, &c. examination of conducting and insulating materials, lightning conductors, private telephone arrangements, and so on. Youths devoting themselves to electro-technical work will have opportunities of gaining thorough practical knowledge in the place.

THE death of Mr. John Ralfs, at Penzance, on the 14th inst., at the age of 83, removes one of the last survivors of a past generation of botanists. His "British Desmidieæ," published in 1848, remains to the present time unsurpassed in botanical literature for the beauty and accuracy of its coloured plates. As it was the first British work (except Hassall's "British Fresh-water Algæ," published three years earlier) which did any justice to this beautiful class of fresh-water organisms, so it remained the only one until the appearance of Dr. Cooke's "British Desmids" in 1887. Mr. Ralfs also contributed several papers on the Mosses, Fungi, and Algæ of his native county to the Transactions of local scientific Societies. Of a retiring disposition, and practising as a surgeon in Penzance, he was but little known personally to his fellow-workers. Within the last two years he was elected an Honorary Fellow of the Royal Microscopical Society.

MR. G. W. RAFTER has contributed to the Transactions of the American Society of Civil Engineers an interesting paper on freshwater Algæ, and their relation to the purity of public water-supplies. He finds that a number of Algæ may assist in rendering drinking-water unpotable, producing a nauseous or "fishy" smell, generally due to the decomposition of their mucilaginous envelope, or of the starch or oil contained in their cells. In addition to the well-known Fungus or Schizomycete *Beggiatoa*, which has the remarkable property of withdrawing sulphur from sulphates in solution, the following freshwater Algæ are especially deleterious when occurring in large masses:—*Cladophora*, *Vaucheria*, *Batrachospermum*, *Draparnaldia*, *Chætophora*, *Volvox*, *Eudorina*, *Pandorina*, *Hydrodictyon*, *Palmella*, *Crenothrix*, *Oscillaria*, and diatoms generally, especially *Meridion circulare*. Desmids appear to be usually innocuous.

THE British Vice-Consul at Los Angeles, in California, in his last Report, has some observations on the vine and orange pests in that region. The vine-disease now seriously menaces the existence of the viticultural industry in the vicinity of Los Angeles. At first it attacked chiefly the "mission" vines; now, other varieties of red vines are dying, and the white varieties are also suffering. The disease first appeared in its present dangerous form in the southern part of California, and destroyed many vineyards. Prof. Dowlen, an expert employed by the Viticultural Commission to ascertain its cause, and, if possible, discover a remedy, inclines to the opinion that it is due to a fungus. On the other hand, Mr. Wheeler, Chief Executive Officer of the Viticultural Commission, reports that he is fully convinced that the fungus found on the dead vines is not the prime cause of their decadence, and that it attacks them only when they have been weakened by other causes. As to the Icerya, or "white scale," which has ravaged the orange-groves, the Vice-Consul says that a year ago many of the principal orange-growers in the vicinity of Los Angeles had abandoned their efforts to exterminate this pest, concluding that their trees must die. Fortunately, it was learned that an Australian parasite, the *Vedolia cardinalis*, had exterminated the white scale in Australia. A colony of the bugs was imported, and placed on the trees in an orchard in Los Angeles; they multiplied so rapidly that in a few months the scale was entirely exterminated in the district; many trees, which a year ago were nearly dead, have revived and borne half a crop this season.

ARTIFICIAL musk is a recent chemical achievement. A process for its production has been patented in Germany, the inventor being Herr A. Bauer, of Gisparsleben, in the Erfurt district. It is a familiar experience in organic chemistry, that on introduction of nitro groups (NO_2) into organic bodies, by action of nitric acid, a smell like that of musk is often noticed. In the present case, pure butyl-toluol is treated with a mixture of sulphuric and nitric acid, and the nitro-compound is purified by crystallization from alcohol, the yellowish-white crystals smelling strongly like musk. According to Dr. Paul (*Humboldt*), the smell is not perfectly pure, and it can be distinguished from that of musk by the perfumer, but not by the general public. Curiously, a 1 per cent. alcoholic solution has not the smell of musk; only after dilution with water does this come out, and the dilution may be carried far before the smell is lost; with 1 in 5000 it is still quite distinct. Certain properties of the new product seem to render it very useful in the perfuming of soap.

THE small toe in man has recently (we learn from *Humboldt*) been made a subject of study by Herr Pfitzner. It is well known that thumbs and great toes are two-jointed, and the other fingers and toes generally three-jointed. In many human skeletons, however, the small toe is found to be two-jointed, the middle and end phalanges being fused into one piece, though still distinguishable. This variety occurs in about 36 per cent. of cases, and, as a rule, in both toes simultaneously; and there are more instances among women (41·5 per cent.) than among men (31·0 per cent.). One naturally thinks here of shoe-pressure causing union of two bones originally separate. But it appears that in children, from birth to the seventh year, and in embryos from the fifth month, the fusion occurs about as often as in adults. Further, the material of examination was not from a class of people who wear tight shoes. Herr Pfitzner concludes that the small toe in man is in course of degeneration (*Rückbildung*), and that without apparent adaptation to external mechanical influences. Processes of reduction are also observed in the connected muscular system. The question arises, Has the tendency reached its limit, or have we merely the first act of a total degeneration of the fifth toe? The author inclines to the latter view, but desires an extension of these researches among peoples who do not wear shoes or sandals, or have only of late begun to wear them. In living persons, it is not difficult to determine, by stretching and bending, whether the small toe is two- or three-jointed; and in this way adequate data might be had for determining any percentage differences in occurrence of the old and the new form in different races; also for investigating the inheritance of acquired characters, members of several successive generations being examined.

DEFECTIVE sight is becoming more general in the United States, and blindness, particularly among the poor, shows a steady growth. So says the British Consul at Philadelphia, whose statements are advanced on the authority of oculists. Purulent ophthalmia of infancy is prevalent in charitable institutions, poor-houses, &c. The disease shows itself within a fortnight after birth. A recent investigation of the blind in the country almshouses and asylums of an adjoining State showed that one out of every five cases of blindness was due to ophthalmia, and that the cases could have been cured if they had been properly treated in time. The disease is said to be contagious, and few or no special precautions have been taken in any of the institutions to prevent its spreading. The increase of the blindness throughout the country has been so marked of late years—four times as great as the increase of population—that it has been made the subject of special investigation by the American Ophthalmological Society, the investigation including a study of the ophthalmia so prevalent in Egypt, to which the ophthalmia of infancy is closely akin.

A VERY odd result of rivalry between two tiger-snakes is recorded by Mr. D. Le Souef, Assistant Director of the Melbourne Zoological Gardens, in the May number of the *Victorian Naturalist*. One of the snakes was large, the other small. Not long ago both happened to fasten on the same mouse, one at each end. Neither would give way, and the larger snake not only swallowed the mouse, but also the smaller snake. In about ten minutes nothing was seen of the smaller snake but about two inches of its tail, and that disappeared next day.

IN the new quarterly statement of the Palestine Exploration Fund, Mr. Flinders Petrie gives a short report of his recent excavations at Tell Hesy, in Palestine. These have proved to be remarkably interesting. The remains of Tell Hesy consist of a mound which is formed of successive towns, one on the ruins of another, and an enclosure taking in an area to the south and west of it. The lowest wall of all—28 feet 8 inches thick, and formed of clay bricks, unburnt—is believed to be that of Lachish, the ancient Amorite city, erected probably 1500 years B.C. Phœnician pottery of about 1100 B.C. is found above its level. Later constructions are the supposed wall of Rehoboam, and remains of the fortifications made in the reigns of Asa, Jehoshaphat, Uzziah, Jotham, and Manasseh. The pottery discovered on the spot is very valuable. "We now know for certain,' says Mr. Petrie, "the characteristics of Amorite pottery, of earlier Jewish and of later Jewish influenced by Greek trade, and we can trace the importation and the influence of Phœnician pottery. In future all the tells and ruins of the country will at once reveal their age by the potsherds which cover them."

M. P. MÉGNIN is engaged in an elaborate study of the varieties of dogs. He has published two volumes on the subject, and a third is to appear shortly. The author tries to give an account of the origin of the varieties at present known.

HERR A. HARTLEBEN, of Vienna, Pest, and Leipzig, has begun the publication, in "Lieferungen," of two works which promise to be very good and useful. They are "Das Luftmeer," by Prof. F. Umlauft, and "Physik und Chemie," by Dr. von Urbanitzky and Dr. S. Zeisel. Both works are illustrated. The former will present an exposition of the principles of meteorology and climatology; the latter is to contain a general account of physical and chemical phenomena in their relation to practical life.

DURING the last few months a fortnightly *Meteorological Bulletin* has been published at Madrid, by a person under the *nom de plume* "Noherlesoom," professing to give the principal features of the weather for the coming fortnight, illustrated by isobaric charts for special days. Some pages of text contain extracts from various orthodox works bearing upon weather prediction. The present state of the science does not warrant predictions of this nature, nor is it stated upon what principles they are made; yet the weather predicted for the first half of July corresponded in some respects to the very unseasonable conditions experienced during that period in this country.

THE new meteorological observatory of San José de Costarica is to be considered a welcome gain to science, seeing that (as Dr. Hann points out) between Mexico in 19° N. lat. and Rio de Janeiro and Cordoba in 22° and 35° S. lat., there has been no observatory of the first rank, either in Central or South America. Recent data from Prof. Pittier there, reveal a remarkable daily period of rainfall. Thus in the five months August to December, while only 1·5 inch of rain fell between midnight and midday, 35 inches, or more than twenty times as much, fell between midday and midnight. Comparing the hours, 6 to 11 a.m., with 2 to 7 p.m., the quantities are 0·3 in. and 27·6 in. Nearly the whole of the rainfall occurs within six hours (75½ per cent.). And the largest amount is towards sunset, not (as commonly supposed about the tropics) in the early hours of the afternoon.

WRITING on the subject of medicine in China, the *North China Herald* of Shanghai observes that medicine in China is very old. In the year 579 B.C. the moxa and acupunture were already practised by Chinese physicians, for it is in that year that this treatmeat is first mentioned in any book, Chinese or foreign. In addition to this there was the celebrated Pien-tsio, who some time during the period from the eighth century before Christ to the sixth performed remarkable cures by feeling the pulse first and basing his treatment upon the indications. On one occasion he was in attendance upon a prince who was in a state of unconsciousness for five days, and he depended on pulse-feeling for his knowledge of the patient's condition. The great books of Chinese medicine belonged to the age of the sages. They are the classics of Chinese medicine, and in them its theories and principles are enshrined. In these books we find such statements as that metal and water combine, in accord with the influence of Venus and Mars. The soul is spoken of as something distinct from though included in the body. Madness, fever, apoplexy, paralysis, cholera, are all described. The five elements are represented as revolving powers, and they correspond to the five planets in the heavens. The earth moves westward through space which surrounds it below as well as above and around. Ignorance of astrology is stated to be a cause of disease and death. Interlaced with the doctrine of the five elements is found the doctrine of the dual principles of darkness and light, each divided into greater and lesser. The veins and arteries are here described as canals originating in the skin, which, consequently, is that part at which all disease commences its invasion of the human frame. The possibility of the human subject securing immortality by Taoist methods is discussed, and the affirmative is believed. The "Soo wên," having in it these and other curious things, such as the rotundity of the earth and the doctrine of a universal and primæval vapour, and having a distinct tincture of the Mesopotamian astrology, constitutes in itself a convincing proof that China was receptive of Western knowledge to a large extent in the fifth, fourth, and third centuries before Christ. From that time during more than two thousand years China has been under the dominion of the philosophy of this book. The writer predicts that a history of Chinese medicine, being the result of the uninterrupted experience of two thousand five hundred years, in spite of its Babylonian theory, now exploded by modern discoveries, would prove deserving of high respect for its practical utility in many important ways.

THE Cambridge Local Lectures Syndicate held a Conference of Local Lecturers and Committees in the Senate House on July 9 and 10, the Vice-Chancellor, Dr. Butler, Master of Trinity College, presiding. The subjects discussed were: (1) the affiliation of lecture centres to the University; (2) the relations with the Education Department; (3) State aid for local lectures, a subject started at Oxford last year, and introduced on this occasion by the request of some of the centres, not as part of the programme of the Syndicate; (4) local finance; (5) work in rural districts; (6) district associations. The subjects were all of them actively discussed, "State aid" being referred back to the Committee which is working in the matter. The whole party, numbering about 180, lunched in the Hall of King's and dined in the Hall of Trinity, as guests of the Syndicate, and visited the Library, the Museums of Science, and the Fitzwilliam Museum, at each of which an expository address was delivered.

THE Syndicate have invited a limited number of their students in various parts of the Kingdom to spend the month of August in Cambridge, for the purpose of quiet and serious study. For some years, individual invitations of this kind have been given by persons interested in the work. The Syndicate have received favourable accounts of the work done and of the effect produced, and they are now making it part of their official business. They had contemplated from 30 to 40 students, but the number of those desirous of coming considerably exceeds that. The principle of the Syndicate is to give to the students opportunities which they could not have in the lecture centres, and on this account the ordinary subjects of local lectures are not included in the curriculum. The work is to last from August 5 to 30 inclusive. Newnham College will give a collegiate home to the women students, and Selwyn to the men, on very moderate terms. The mornings will be given to the science students, whose work will consist of courses of experimental demonstrations in the laboratories of chemistry, physics, geology, &c. The afternoons will be given to the art students, whose work will consist of series of lectures on Greek art, early English sculpture and inscriptions, early engraving, and architecture, all illustrated from the art collections and the buildings in Cambridge. Single lectures will be given, by leading residents in Cambridge, on subjects of which they have special knowledge, and this, no doubt, will be a feature of unusual interest and profit. The University Library, the Philosophical Library, and the Library of Art and Archæology, will all be open to the students by special arrangement for reading and study. Special lectures will be given on King's Chapel and Ely Cathedral, and the manuscript and other treasures of some of the College libraries will be shown and described in detail. Visits will be paid to the Observatory by day, for the inspection of the astronomical instruments, and Prof. Adams or his representative will receive small parties of the students at night. It is proposed to give to those who go satisfactorily through the regular course of study some record of what they have done. Several of the lecture centres have given scholarships of £10 to their best students to enable them to go to Cambridge, and the Syndicate are meeting all prizes of this kind by a remission of the small lecture fee. The advantage of working in small parties of 10 or 12 at such subjects as those indicated, and under such circumstances, can scarcely be exaggerated. The determination of the Syndicate is that the whole course of study shall be serious and quiet, but social amenities will not be disregarded.

THE Report of the Cambridge Local Lectures Syndicate, recently issued, is unusually encouraging. The number of students and of courses of lectures is larger than ever, and the proportion of serious students to the whole number attending the lectures shows a remarkable increase. It is easy to get a large number of people to come to popular lectures, but to make people who come to lectures into serious students is a different matter. Nearly half of the whole number of 11,500 students have attended not the lecture only, but also the "class" for more detailed work by question and answer which always precedes or follows the lecture in the Cambridge system. More than a fifth part of the whole have written papers weekly for the lecturer, and the examinations at the end of the respective courses have been attended by nearly one in six. This is an interesting record of solid work done. A specially satisfactory feature of the year's work has been the manner in which the centres have supported the Syndicate in keeping up the lectures in each course to the full number of twelve, which is an integral part of the Cambridge system. Of 125 courses only five have been "half-courses" of six lectures, given under special circumstances and without the privilege of an examination. Thus the total number of lectures given has been about 1470, and the number of attendances at lectures not far off 140,000.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♀ ♀) from India, presented by Captain C. Taylor; a Hawfinch (*Coccothraustes vulgaris*), British, presented by Mr. L. C.

Wharton; a Snow Bunting (*Plectrophanes nivalis*), European, presented by Mr. J. Young, F.Z.S.; a Common Boa (*Boa constrictor*) from Venezuela, presented by Mr. R. J. Money; a White-thighed Colobus (*Colobus vellerosus* ♂) from West Africa, a Cape Ratel (*Mellivora capensis* ♂) from South Africa, an Arctic Fox (*Canis lagopus* ♀) from the Arctic Regions; four Spoonbills (*Platalea leucorodia*), European, a Short-toed Lark (*Calendrella brachydactyla* ♂) from Algeria, purchased; four Australian Wild Ducks (*Anas superciliosa*), two Slender Ducks (*Anas gibberifrons*), eight Chilian Pintails (*Dafila spinicauda*), six Summer Ducks (*Æx sponsa*), four Mandarin Ducks (*Æx galericulata*), two Red-crested Pochards (*Fuligula rufina*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on July 24 = 18h. 10m. 17s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	° ′
(1) G.C. 4390	—	—	18 6 45	+ 6 49
(2) G.C. 4403	—	—	18 14 17	−16 13
(3) D.M. + 43° 2890 ...	8	Reddish-yellow.	18 3 29	+43 26
(4) η Serpentis	3	Yellow.	18 15 36	− 2 56
(5) γ Ophiuchi	3	White.	17 42 16	+ 2 45
(6) D.M. + 36° 3243 ...	8	Red.	18 39 0	+36 50

Remarks.

(1) This small bright nebula was thought by W. Struve to be one of the most curious objects in the heavens. The G.C. description is: "A planetary nebula; very bright; very small; round; a little hazy." According to D'Arrest, its diameter is about 7″. The observations of Dr. Huggins and Captain Herschel show that the spectrum consists of the three chief nebula lines, and a faint continuous spectrum. Dr. Huggins also notes that "the lines are exceedingly sharp and well-defined." This latter observation requires confirmation, and the spectrum should also be examined for other lines, as we know that a greater number of lines are seen in other nebulæ of the same class.

(2) This is the so-called "Horse-shoe Nebula," which is thus described by Herschel: "A very remarkable object; bright; extremely large; extremely irregular figure; 2-hooked." The spectrum has been observed both by Dr. Huggins and Captain Herschel. The former noted in 1866 that the line near λ 500 was visible, in addition to a faint continuous spectrum, and added: "When the slit was made as narrow as the intensity of the light would permit, this bright line was not so well defined as the corresponding line in some of the other nebulæ under similar conditions of slit, but remained nebulous at the edges." It will be seen that this observation gives the chief line a very different character to the preceding one (4390), and it is very desirable that the discrepancy should be cleared up, especially as Dr. Huggins has recently stated that the line is always seen sharp and well defined, although there is no evidence to show that he has reobserved the nebulæ in which he formerly recorded it as ill defined. It is important that both nebulæ should be examined as nearly as possible at the same time with the same instrumental conditions. Captain Herschel simply writes: "Bright object; bright lines."

(3) The spectrum of this star is one of great interest in connection with the view that stars of Group II. are similar in constitution to comets. Dunér states that, notwithstanding the small magnitude of the star the bands are very well seen even in the ultra blue, and that they are so wide and dark that the spectrum is totally discontinuous, especially in the blue-green and the blue. Now it seems pretty evident that all the light referred to in the blue in a faint star like this cannot be due simply to continuous spectrum, and it is therefore probably due to the radiation of some substance. This substance is probably carbon, giving a series of bright flutings in the blue-green and blue, and giving rise to apparent dark bands, which are in all probability simply the dark spaces between the bright flutings. The measurements made by Dunér and Vogel of the bands in other stars show close coincidences with the carbon flutings, but the question can only be finally decided by direct comparisons. If the existence of the carbon flutings be confirmed, then we must conclude that stars of Group II. and comets showing the same series of flutings are identical in constitution.

(4 and 5) These are stars of the solar type and of Group IV. respectively, and the usual more detailed observations are required in each case.

(6) The observations of Secchi and Dunér show that the spectrum of this star is a well-marked one of Group VI.; but the only details observed were three "zones" separated by two strong dark bands. Further details and deviations from the regular type should be looked for.

A. FOWLER.

NICE OBSERVATORY.—The third volume of the "Annales de l'Observatoire de Nice" contains a new map of the solar spectrum by the late M. L. Thollon, the whole of the theory of the minor planet Vesta by M. Perrotin, the Director of the Observatory, and numerous observations of comets and planets made by M. Charlois.

The part of the spectrum mapped by M. Thollon extends from A to *b*, and is contained on seventeen beautifully engraved plates, each having two horizons 32 cm. long. The whole length is thus a little over ten metres, and the number of lines contained in it is about 3200, of which 2090 are said to have a solar origin, 866 are purely telluric, and 246 have a mixed origin—that is to say, they result from the superposition of solar and telluric lines.

Each of the 33 horizons is divided into millimetres, from 0 to 320, hence the lines can easily be read off to $\frac{1}{10}$ of a division. Thollon intended at the beginning of his work to express the position of the lines on a scale of wave-lengths, and this would doubtless have facilitated their identification to a considerable extent; but the method of relative measurement which he adopted was more accurate than the absolute measures made by Ångström, and he found that to use a wave-length scale it would be necessary to alter a number of accepted places of lines or to alter his measured intervals. It is rather unfortunate that such should be the case, for ready reference to the lines and comparisons of them with those mapped by other observers are rendered somewhat difficult. Beneath each scale are four horizons on which are respectively represented: (1) the appearance of the lines when the sun is 80° from the zenith and the air is dry; (2) the appearance of the lines when the sun is 60° from the zenith and the air is very moist; (3) the appearance of the lines when the sun is 60° from the zenith and the air is very dry; (4) the lines of solar origin—that is, those that would be observed from outside our atmosphere. The width of the lines was determined for each of the four horizons, and intensities are expressed from 1 to 10, 1 indicating the weakest and 10 the strongest lines. The values for each line are given in the text relating to the maps. Another horizon gives the position of iron lines, but this is incomplete in some of the maps owing to M. Thollon's death.

The theory of Vesta, by M. Perrotin, is in continuation of that published in the first volume of "Annales de l'Observatoire de Toulouse, 1880," and deals with the algebraical expressions of the perturbations produced on its elements by different planets.

ENLARGEMENT OF PHOTOGRAPHS OF STELLAR SPECTRA.—The enlargement of all the photographs of stellar spectra taken under Prof. Pickering's direction at the Henry Draper Memorial observatories is made by means of a cylindrical lens, and the result of the adoption of this method is well known. Dr. Scheiner, of Potsdam Observatory (*Astronomische Nachrichten*, No. 2969), has obtained even better results by fixing the negative lengthways in a frame which has a to-and-fro movement. The motion causes the width of the lines to be increased on the plate being exposed, in a manner similar to the increase that takes place when a cylindrical lens is inserted between it and the negative. The advantage of the arrangement over that of Prof. Pickering lies in the fact that the diminution of the intensity of the lines in the process of enlargement is much less.

The method now described by Dr. Scheiner has been used successfully at South Kensington for some time.